NORTHEAST ELECTRONICS

A DIVISION OF NORTHERN TELECOM, INC.

INSTRUCTION MANUAL

MODEL TTS -58C

IMPULSE NOISE COUNTER

No. A0058-30-600 ISSUE 1 DATE APR 1973

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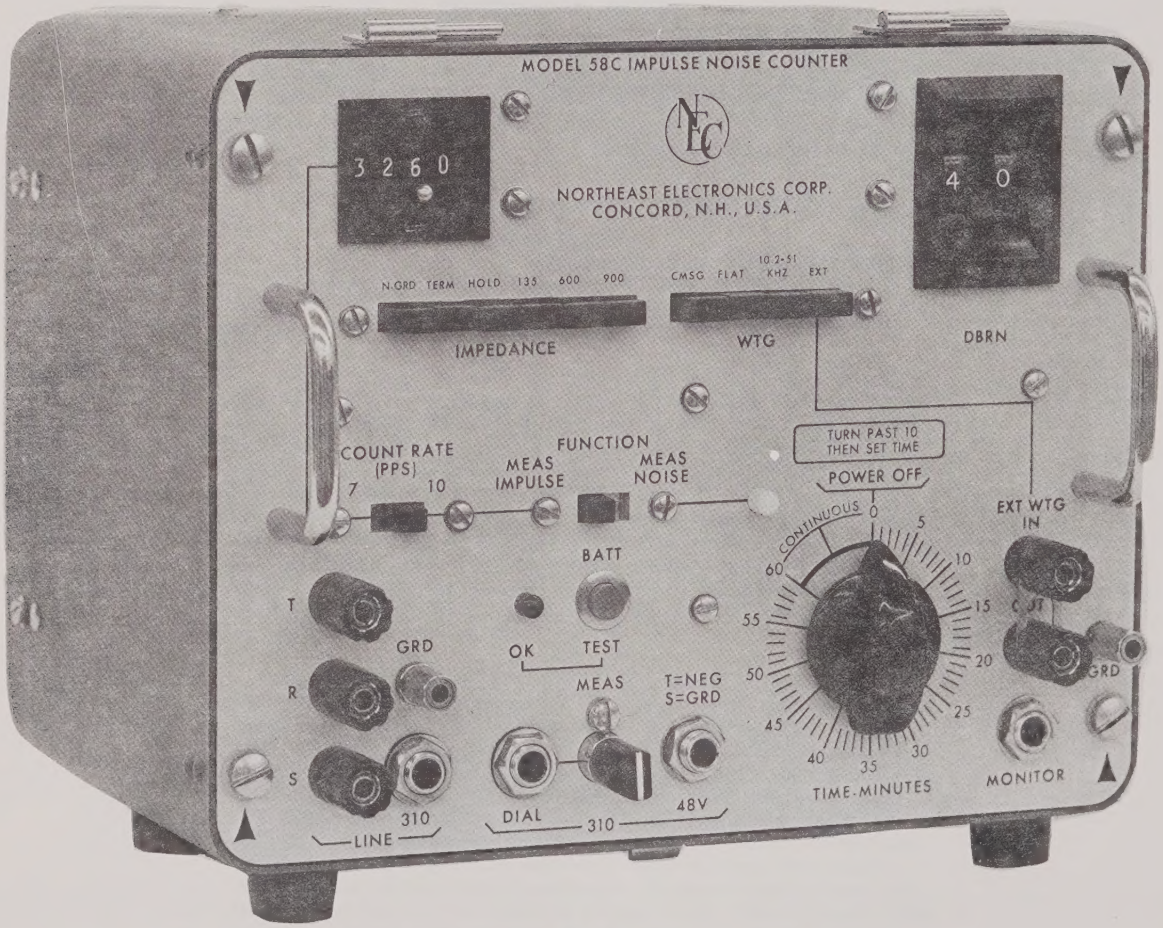


Figure 1-1. Model 58C Impulse Noise Counter

SECTION 1

GENERAL DESCRIPTION

1.1 General Description: The Model 58C is an Impulse Noise Counter and Circuit Noise Measuring Set utilizing a mechanical readout for recording impulse hits at threshold levels from 20 dBrn to 99 dBrn in 1 dB increments. A slide switch allows for selection of either a 7 or 10 pulse per second count rate. A built-in timer provides for observation periods of up to one hour. An output monitor jack allows the operator to monitor or record the signal being measured.

1.2 The set will measure the value of metallic noise from 20 to 99 dBrn, weighted or flat, and longitudinal Noise-To-Ground from 60 to 139 dBrn.

1.3 Three internal weighting networks, C-MSG, FLAT, and 10.2-51 kHz are provided. Connections for external weighting are also available on the front panel with flat response to >100kHz.

1.4 Input Impedance of 135, 600 and 900Ω, bridging or terminated are provided, plus dial through capability with holding circuit.

1.5 The unit operates from internal batteries with a battery life of 200 hours or from -48 VDC CO Battery Source. It weights $11\frac{1}{2}$ pounds and measures 9" w x 7" h x $8\frac{1}{2}$" d.

SECTION 2

SPECIFICATIONS

SENSITIVITY

Metallic: Impulse Noise and Circuit Noise; 20 to 99 dBrn

Longitudinal Noise-To-Ground: 60 to 139 dBrn. 40 db REF

INPUT IMPEDANCES

Balanced Input Transformer.

a. Terminated 135,600 or 900Ω.

b. Bridging loss less than 0.25 dB @ 1 kHz.

FREQUENCY RESPONSE

Wide band (EXT) -3 dB: <50 Hz >100 kHz.

10.2-51 kHz, C-MSG, FLAT. 3 db POINTS

COUNTING RATE

7pps or 10 pps selectable by front panel switch

HOLD CIRCUIT

Hold Coil: DC Resistance 500Ω ±20%

POWER REQUIREMENTS

a. Battery Operation:

12"D" cell batteries

Current Drain: approximately 100 mA peak, 60 mA average

b. 48 volt operation.

SIZE:

9" w x 7" h x 8½" d.

WEIGHT:

11½ pounds.

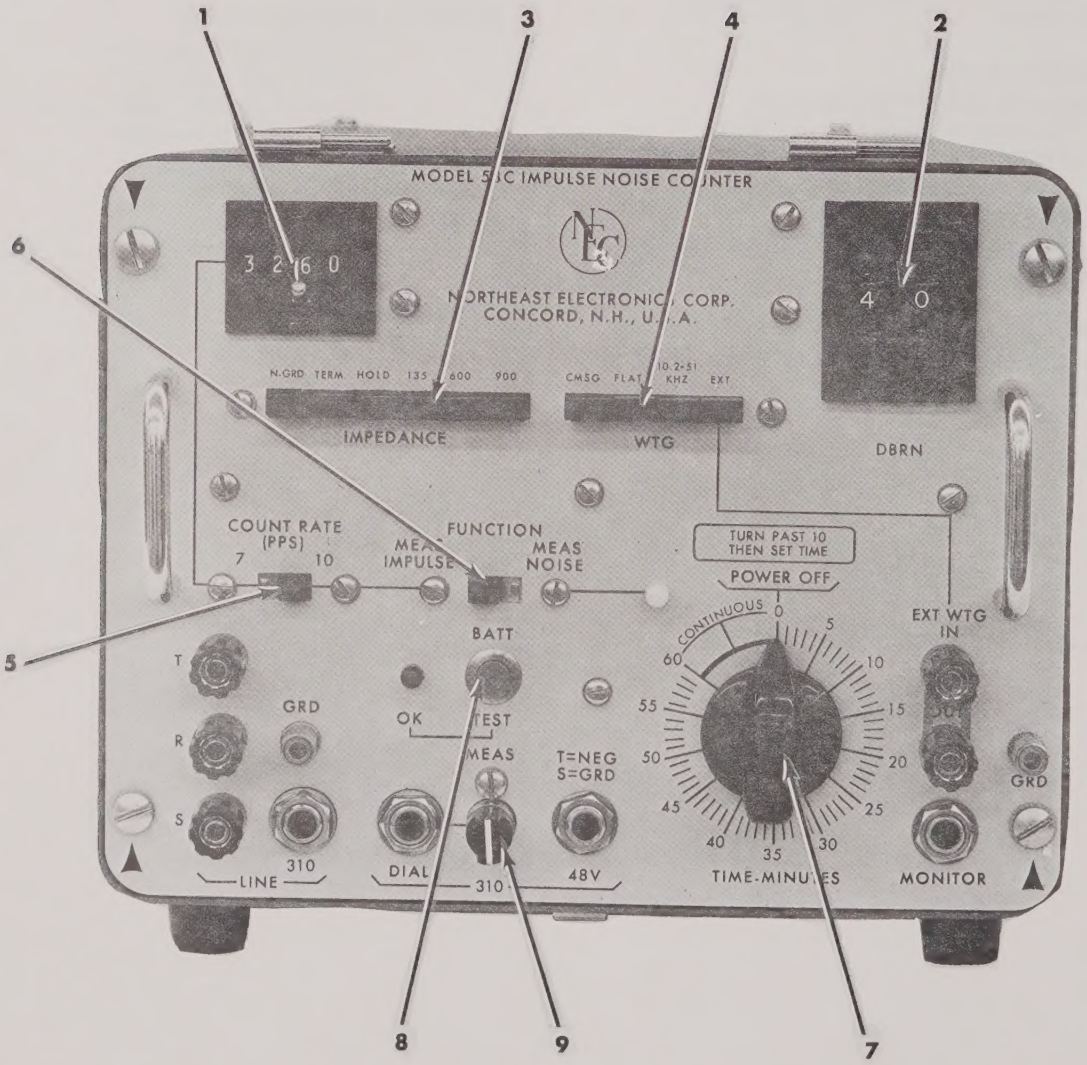


Figure 3-1. Front Panel Controls

SECTION 3

OPERATING INSTRUCTIONS

3.1 FRONT PANEL CONTROLS

	NAME OF CONTROL	FUNCTION
1.	COUNTER RESET (mechanical)	Resets mechanical counter to all zeros.
2.	DBRN (Thumbwheel Controls)	Attenuator, 10 dB and 1 dB steps, for setting the threshold sensitivity for either impulse or circuit noise measurements.
3.	IMPEDANCE (Push Buttons)	Provides for selection of the following: Noise-To-Ground. Measurements Bridging or Terminate Hold Circuit 135,600 or 900Ω impedance
4.	WEIGHTING (Push Buttons)	Selects C-MSG, FLAT, 10.2-51 kHz or EXT weighting.
5.	COUNT RATE	Selects either a 7 or 10 pps count rate.
6.	FUNCTION	Allows for selection of counting Impulse noise or measuring the average value of Metallic Noise.
7.	TIME-MINUTES (POWER)	60 minute timer with a countiuous operating position. Timer applies power to the set when activated.
8.	BATT TEST (Push Button)	Indicates battery condition. (Timer must be activated).
9.	MEAS (Turn Button Switch)	Provides for connecting line circuit to dial jack.

3.2 OPERATION: Turn TIME-MINUTES Control counter-clockwise to continuous position. Depress BATT TEST push button. TEST OK light should illuminate.

3.3 Connect the external line to be tested to the LINE jack or to the T-R-S binding posts. A type 310 or a twin banana plug can be used to establish connection to the Model 58C input circuit.

3.4 If the line connection is to be dialed:

a. Connect a dial or telephone to the DIAL jack using a 310 type plug.

b. Place MEAS turnbutton switch in the horizontal position. This transfers all line jacks to the DIAL jack.

c. Select desired impedance function, i.e. 900Ω, TERM, HOLD.

d. Dial the desired number.

e. When line connection has been established, place MEAS turnbutton switch in the vertical position.

f. The dial may now be removed. The internal hold circuit will maintain the connection.

3.5 Select the desired weighting characteristic. If an external weighting network is to be used, remove shorting link between IN and OUT binding posts and make the appropriate filter connections to these binding posts. External weighting networks to be used should be for 600Ω impedance and any insertion loss added to the sensitivity setting of the Model 58C. Other networks with other impedances may be used and the change in gain added to or subtracted from the sensitivity setting.

3.6 TO MEASURE CIRCUIT NOISE. Slide FUNCTION switch to the MEAS NOISE position. DO NOT attempt to measure circuit niose during an impulse noise test.

3.7 a. If the NOISE lamp is on: operate the DBRN control to decrease sensitivity until the MEAS NOISE lamp blinks or is on the threshold of turning off.

b. If the MEAS NOISE lamp is off: Operate the DBRN control to increase sensitivity until the MEAS lamp blinks or turns on.

NOTE

For either of the above cases, the corresponding sensitivity setting is the average value of the circuit noise.

3.8 TO MEASURE NOISE TO GROUND. Connect line to be tested to the LINE jack or T-R-S binding posts. Depress the N-GRD pushbutton.

3.9 Proceed as in 3.6 and 3.7 above. Add 40 dB to the dBrn control setting.

3.10 TO MEASURE IMPULSE NOISE. Slide FUNCTION switch to MEAS IMPULSE position. Set sensitivity by operating DBRN control to the desired threshold level

3.11 Set desired count rate, 7 or 10 pps.

3.12 If test is to be timed, rotate the TIME-MINUTES control clockwise past 10 and set to desired time.

3.13 Immediately and momentarily depress the counter reset. This resets the counter to zero and establishes the start of the impulse noise test.

CAUTION:

From the start and during the course of an impulse noise test, DO NOT readjust or activate any controls.

3.14 At the end of test when timer has returned to zero, record the reading on the mechanical counter.

3.15 TO MONITOR. Plug headset in the MONITOR jack which accepts a 310 type plug. Output level is approximately -24 dBm in 600Ω. Monitor response is determined by the weighting networks selected. Signal is tip, ring and sleeve are ground.

SECTION 4

CIRCUIT DESCRIPTION

4.1 INPUT CIRCUIT LINE SECTION (See Figure 7-1)

a. The balanced input circuit provides a choice of connectors for establishing connection to the line. Turn button switch S5 connects all line jacks to the dial jack for dialing purposes.

b. The hold circuit consisting of inductor L1 is placed across the line by depressing push button S103.

c. The terminations are selected by push buttons S104, S105, and S106 and consist of resistors R101,R102 and R103. The terminating resistor selected appears across the line via the terminate switch S102.

d. DC blocking up to 150V is provided by capacitors C119 and C120 in series with the balanced line input.

e. Transformer T1 presents a balanced input to the line. Impedance switches select the proper transformer circuit connections for impedance level equalization.

f. N-GRD. Measurements are made by depressing pushbutton S101. The Terminations and Transformer T1 are removed from the circuit in this mode. A 40 dB balanced loss pad, consisting of R132 through R135, is inserted in the line after the dc blocking capacitors.

4.2 INPUT AMPLIFIER (See Figure 7-1)

a. The input amplifier has a gain of approximately 44 dB determined by the ratio of resistors R107,R108 and R109. The input attenuator, located on deck 3 of switch S1, has 0 dB of loss in the 20 through 50 dBrn position and 40 dB loss in the 60 through 90 dBrn position. Following the input amplifier is a second attenuator, located on deck 2 of switch S1, providing the proper source impedance for the wieghting networks in addition to losses of 0, 10, 20 and 30 dB.

4.3 WEIGHTING NETWORKS (See Figure 7-1)

a. The impedance for the filters is 600Ω for both source and load. The source impedance is provided by the second attenuator and the load impedance is provided by the third attenuator located on deck 1 of switch S1.

b. The C-MSG wieghting characteristics are determined by the passive elements of the filter with an insertion loss of approximately 9.5 dB.

c. In the flat weighting network, capacitor C107 limits the high frequency response with a 6 dB per octave roll-off. Resistors R121,R122 and R123 provide impedance matching and level equalization with an adjusted loss of approximately 9.5 dB.

d. The 10.2-51 kHz band pass filter network is a cascaded High Pass-Loss Pass filter with approximately 18 dB per octave slopes. Resistors R124,R125 and R126 provide impedance matching and level equalization with an adjusted loss of approximately 9,5 dB.

e. In the EXTERNAL WTG. position, connections are brought out to a pair of binding posts on the front panel. Resistors R118,R119 and R120 provide impedance matching and level equalization with an adjusted loss of approximately 9.5 dB.

f. The third attenuator, located on deck 1 of S1, provides the proper terminating impedance for the weighting networks in addition to 9 dB of attenuation in 1 dB steps

4.4 IMPULSE PEAK DETECTOR (See figure 7-2)

The impulse peak detector consists of an amplifier, U201, driving a DC biased diode bridge, U203. The bridge holds a DC amplifier, U202,in an off condition. The sensitivity of amplifier U201 is approximately -41.5 dB and is determined by the ratio of resistors R204,R205 and R207. Variable resistor R211, located in series with the bridge bias circuit, provides a means for adjusting the bias to give equal triggering on both polarities of the input signal.

4.5 The DC amplifier, U202, is biased in a normally off condition. When the input signal peak exceeds the sensitivity setting, the bias condition is overcome and the amplifier output switches thereby generating a rectangular pulse.

4.6 COUNTRATE TIMER (See figure 7-2) U301, Q301 and Q302 constitute the Blanking Interval Circuitry which gates the counter for the selected countrate.

4.7 The circuit is activated by an impulse hit which drives pin 10, U202, to 0 volts. This voltage is coupled to pin 4, U301, and causes pin 2, U301, to switch from low to high, thus placing a positive charge on the timing capacitor C301. The capacitor discharges through the base of Q302. The levels at pins 4 and 5 keep U301 from changing state until the capacitor is sufficiently discharged. At that time. Q302 releases, U301 changes stage and the capacitor charges through Q301. When Q301 releases, the cycle is ready to repeat. The mechanical Impulse Counter is driven by Q304 which is gated by the countrate timing circuit.

4.8 CIRCUIT NOISE DETECTOR (See figure 7-2) The circuit noise detector consists of a DC amplifier, U204, which averages the signal being measured. When the instrument sensitivity is adjusted such that the circuit noise measured is sufficient to trigger U204, Q205 is turned on and the NOISE LAMP, DS2, illuminates.

4.9 POWER SUPPLY REGULATORS (See figure 7-2). The -10V regulator is a series pass configuration with zener reference. Regulator supply is either internal battery, or -48 VDC supplied via a panel jack which accepts a 310 type plug. The -5V regulator is also a series pass configuration utilizing a voltage divider for reference. Supply for the -5V regulator is from the -10V buss.

4.10 BATTERY TEST CIRCUIT: Depressing the battery test switch, S4, will illuminate the TEST OK lamp, DS1 as long as battery voltage is sufficient to fire the -10V reference zener. The lamp will not illuminate when battery voltage falls below the required level.

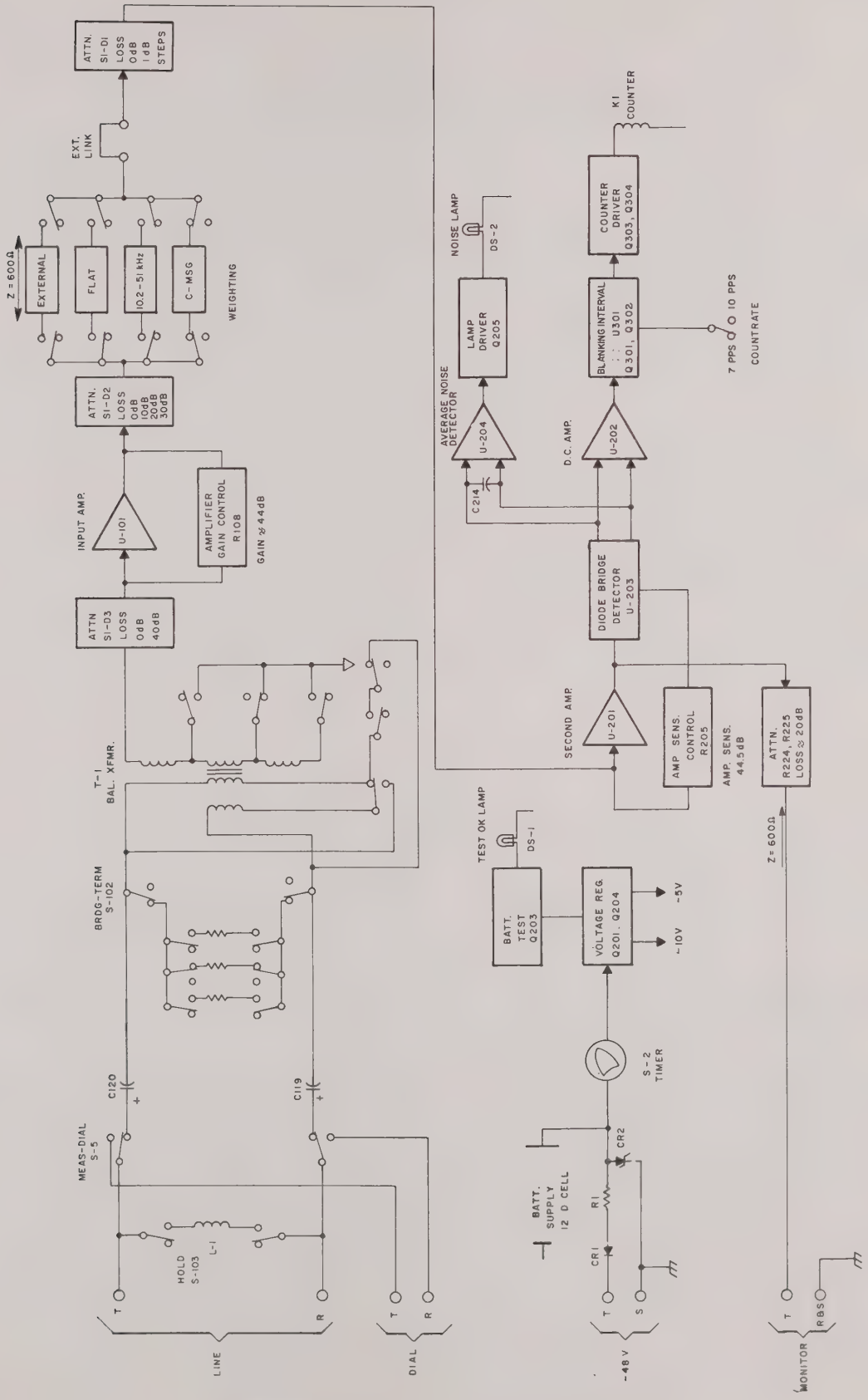


Figure 4-1. Model 58C Block Diagram

SECTION 5

MAINTENANCE AND CALIBRATION

5.1 MAINTENANCE. The overall schematic diagram identifies all components within the instrument. TEST POINT WAVEFORMS, VOLTAGES, and LEVELS also appear on the diagram.

5.2 TROUBLESHOOTING. In the event of a malfunction, ensure that:

a. The batteries test good or, if on -48V operation, that the dc power cord has proper polarization and is properly connected.

b. All external line plugs are properly wired and inserted in the correct jacks.

c. All controls are set in accordance with the operation section of this manual.

d. The test being performed is within the specification limits of the instrument.

NOTE

When it has been determined that a malfunction does exist, an attempt at interpreting the symptoms should be made before removing the set from the case. See table 5-1.

5.3 To remove the set from the case, proceed as follows:

a. Switch off power to the set.

b. Loosen four captive screws indicated by arrow heads on front panel.

c. Carefully withdraw set from the case, and if desired, disconnect power cord from the battery compartment.

d. Reconnect power cord when necessary and switch power on when needed.

TABLE 5-1

SYMPTOM	PROBABLE CAUSE
Set is inoperative in both impulse and circuit noise mode but not in impulse mode.	First or second amplifier not functioning. Check U101, U201.
Set functions in circuit noise mode but not in impulse mode.	DC amplifier, U202 countrate timer, or counter driver circuitry not functioning. Check U202, U301, Q301-Q304.
Set functions in impulse mode but not in circuit noise. Noise lamp not functioning.	DC amplifier, U204; lamp driver or lamp not functioning. Check U204, Q205 and DS-2.
Intermittent or abnormal counter operation.	Battery voltage at or below required operating level. Check batteries.

5.4 TEST EQUIPMENT REQUIRED

TABLE 5-2

EQUIPMENT	USE
VOM: NEC Model 2000, Triplett Model 680-NA, or equivalent.	To measure dc volts
VTVM: NEC Model 2000, TTS 4C or Hewlett-Packard 400 series	To measure dBm and/or low level ac volts
OSCILLOSCOPE: Any suitable model oscilloscope.	To observe waveforms
OSCILLATOR: NEC TTS 4C, TTS 43A or equivalent.	Calibrated signal source

5.5 CALIBRATION. The Model 58C has been calibrated at the factory before shipment. Recalibration should only be performed if component parts are replaced because of a malfunction. Only the circuit directly involved with the component replacement need be re-calibrated.

5.6 CIRCUIT NOISE CALIBRATION CHECK.

a. Set up Model 58C Front Panel Controls as follows:

PUSHBUTTONS	TERM, 600Ω, C-MSG
DBRN (Thumbwheels)	50
FUNCTION	MEAS. NOISE
POWER	CONTINUOUS

b. Connect a 1 kHz signal with a level of -40 dBm from a 600Ω source to the line input of the Model 58C. The MEAS. NOISE lamp should be on the threshold of lighting ±0.3 dB.

5.7 CIRCUIT NOISE CALIBRATION. If it is found necessary to recalibrate, first determine in what section the error exists.

a. With conditions outlined as in 5.6 (a) above, decrease input level to -50 dBm and set the DBRN CONTROL to 40 dBrn.

b. Refer to the overall schematic diagram and use indicated levels for reference.

c. If the error is found to exist at the output of the first amplifier, U101 then the amplifier gain control, R108 needs adjustment.

5.8 a. If the error still exists and/or the second amplifier, U201, was changed proceed to Impulse Noise Calibration, paragraph 5.9.

b. If the error still exists but only in the FLAT, 10.2-51 kHz, or EXT. weighting, proceed as follows:

1. Measure and record the signal level at pc 1.5 while in C-MSG weighting.

2. Switch to weighting position in which error occured.

3. If in FLAT position, adjust R123 for signal level recorded in step (1).

4. If in EXTERNAL position, adjust R120 for signal level recorded in Step (1)

5. If in 10.2-51 kHz position, change signal frequency to 25 kHz and adjust R126 for signal level recorded in step (1

5.9 IMPULSE NOISE CALIBRATION CHECK.

a. Set up Model 58C Front Panel Controls as follows:

PUSHBUTTONS	TERM 600 C-MSG
IMPULSE LEVEL, DBRN	40
FUNCTION	MEAS. IMPULSE
COUNTRATE	7 PPS
POWER	CONTINUOUS

b. Connect a 1 kHz signal with a level of -53 dBm from a 600Ω source to the Line Input of the Model 58C.

c. Adjust Input Level for periodic count accumulation at threshold. Resulting Input Level should be within ±0.5 dB of -53 dBm.

d. If an error exists, perform steps 5.7 and 5.8 before continuing.

5.10 Impulse Noise Calibration. If the average noise calibration has been carried out and an error still exists, or if the second amplifier, U201 has been changed and recalibration is necessary, proceed as follows:

a. Set up Model 58C Front Panel Controls as in paragraph 5.9 (a). Connect a 1 kHz signal with al level of -53 dBm from a 600Ω source to the line input of the Model 58C.

b. If U201 was not changed, adjust R205 for periodic count accumulation at threshold. only a slight adjustment should be necessary

5.11 If U201 was changed, the BALANCE Control, R211, may require readjustment to insure equal sensitivity to both polarities of the input signal. Proceed as follows:

a. Connect Oscilloscope to TP2.3 located on PC2. Adjust oscilloscope for positive internal triggering with horizontal time base set for 0.1 ms/cm and vertical sensitivity of 5V/cm.

b. Increase input signal level to -52.5 dBm and adjust oscilloscope for correct horizontal triggering.

c. Observe waveform and adjust balance control, R211 for a recurring rectangular pulse every 0.5 ms. This indicates that the impulse detector is triggering on both polarities of the input signal.

d. Decrease input level to -53 dBm and adjust amplifier gain control, R205 for periodic count accumulation.

e. At this threshold level, triggering on only one polarity will be observed. Increasing input level by 0.2 or 0.3 dB should result in a pulse every 0.5 ms. Correct adjustment of the balance control is indicated when triggering of both polarities of the input signal occurs within 0.5 dB of threshold.

5.12 COUNTRATE TIMER CALIBRATION CHECK

a. Set up Model 58C Front Panel Controls as in paragraph 5.9 (a). If possible, power the 58C from -48V or use fresh batteries.

b. Connect a 1 kHz signal with a level of -50 dBm from a 600Ω source to the line input of the Model 58C. Instrument should be counting.

c. Connect an oscilloscope to the postive end of C301. Adjust the oscilloscope for positive internal triggering with horizontal time base set for 20ms/cm and vertical sensitivity of 5V/cm.

d. Adjust scope for proper horizontal triggering.

e. The time for one complete cycle of the waveform should be 143ms. If recalibration is necessary, adjust R306 for the correct time period.

f. Change countrate to 10 pps. Adjust oscilloscope horizontal time base for 10ms/cm.

g. The time for one complete cycle should be 100ms. If recalibration is needed, adjust R304 for the correct time period.

ELECTRONIC PARTS LIST

6.1 INTRODUCTION.

6.2 The following pages contain the parts list for the Model 58C Impulse Noise Counter.

6.3 FSCM CODE NUMBERS.

6.4 This is the Federal Supply Code of Manufacturers as issued October 1969. A list of codes and their respective manufacturers is given below.

LIST OF MANUFACTURERS

Code No.	Manufacturer
00303	Shelly Associates Inc. Segundo, Calif. 90245
01121	Allen Bradley Milwaukee, Wis. 53204
01295	Texas Instrument Inc. Dallas, Texas 75231
05397	Union Carbide "Kemet" Div. N.Y., N. Y. 10017
06486	IRC Division of TRW Lynn, Mass. 01905
08538	Chicago Dynamic Ind. Chicago, Ill. 60614
09353	C&K Components Inc. Newton, Mass. 02158
12065	Transitron Electric Corp. Boston, Mass. 02128
15801	Fenwal Electronic Inc. Framingham, Mass. 01701
15873	Motorola Inc. Arcade, N.J. 14009
18324	Signetics Corp. Sunnyvale, Calif. 94086
22650	Whale Electronics Nashville, Tenn.
49671	RCA Corp. N.Y., N. Y. 10020
71450	CTS Corp. Elkhart, Ind. 46514
71590	Centralab Milwaukee, Wis. 53201
75523	Sodeco N.Y., N. Y. 10036
79919	Rhodes M H Inc. Hartford, Conn. 06101
81073	Grayhill Inc. La Grange, Ill. 60525
81095	Triad Transformer Corp. Venice, Calif. 90293
82389	Switchcraft Inc. Chicago, Ill. 60630
83330	Herman H. Smith Inc. Brooklyn, N.Y. 11207
86632	Newton Engineering Newton, Mass. 02161
99800	Delevan Electronics Corp. Auroa, N.Y. 14052

PC Board E95600

Amplifier and Filter Board

Ref Desig.	Description	Manufacturer (FSCM Code No.)	Part Number
R101	R: 137Ω, ±1%, ½W	06486	CECTO
R102	R: 634Ω, ±1%, ½W	06486	CECTO
R103	R: 953Ω, ±1%, ½W	06486	CECTO
R104	R: 82K, ±10%, ¼W	01121	CB
R105	R: 180K, ±10%, ¼W	01121	CB
R106	R: 270K, ±10%, ¼W	01121	CB
R107	R: 536Ω, ±1%, 1/8W	06486	CEATO
R108	Potentiometer 200	71450	UPE200RE1
R109	R: 100K, ±1%,1/8W	06486	CEATO
R110	R: 1500Ω, ±10%, ¼W	01121	CB
R111	R: 600Ω, ±1%, 1/8W	06486	CEATO
R112	R: 1910Ω, ±1%, 1/8W	06486	CEATO
R113	R: 887Ω, ±1%, 1/8W	06486	CEATO
R114	R: 6040Ω, ±1%, 1/8W	06486	CEATO
R115	R: 665Ω, ±1%, 1/8W	06486	CEATO
R116	R: 18.7K, ±1%, 1/8W	06486	CEATO
R117	R: 600Ω, ±1%, 1/8W	06486	CEATO
R118	R: 383Ω, ±1%, 1/8W	06486	CEATO
R119	R: 237Ω, ±1%, 1/8W	06486	CEATO
R120	Potentiometer 200	71450	UPE200RE1
R121	R: 383Ω, ±1%, 1/8W	06486	CEATO
R122	R: 237Ω, ±1%, 1/8W	06486	CEATO
R123	Potentiometer 200	71450	UPE200RE1
R124	R: 383Ω, ±1%, 1/8W	06486	CEATO
R125	R: 237Ω, ±1%, 1/8W	06486	CEATO
R126	Potentiometer 200	71450	UPE200RE1
R127	R: 681Ω, ±1%, 1/8W	06486	CEATO
R128	R: 619Ω, ±1%, 1/8W	06486	CEATO
R129	R: 85Ω, ±1%, 1/8W	06486	CEATO
R130	R: 1800Ω, ±1%, 1/8W	06486	CEATO
R131	R: 183.7Ω, ±1%, 1/8W	06486	CEATO
R132 and R133	R: 39.2K, ±1%, 1/8W	06486	CEATO
R134	R: 80.6K, ±1%, 1/8W	06486	CEATO
R135	R: 1.0K, ±1%, 1/8W	06486	CEATO
C101	C: 0.22μF, @50V	05397	KR22W50K
C102	C: 20μF, @15V	13606	TE-1157
C103	C: 8.2μF, @15V	05397	K8R2W15K
C104	C: 100pF, @1kV	71590	DD-101
C105	C: variable 5-25pF	72982	557-091COPO-39R
C106	C: 20μF, @15V	13606	TE-1157
C107	C: 0.039μF, @100V	13606	225P
C108 and C109	C: 0.03μF, @100V	13606	225PW
C110 and C111	C: 0.006μF, @100V	13606	225PW
C112	C: 1μF, @35V	05397	K1W35K
C113 and C114	C: 0.2μF, @75V	13606	225P
C115	C: 0.15μF, @75V	13606	225PZ
C116	C: 0.25μF, @75V	13606	225PZ
C117	C: 0.2μF, @75V	13606	225P
C118	C: 0.47μF, @25V	13606	5C11
C119 and C120	C: 100μF, @150VDC	13606	39D107F150FP4
L101	Inductor 7500μhy	99800	2500-70
L102	Inductor 2700μhy	99800	2500-48
L103	Inductor 150mhy	81095	EA-150
L104 and L105	Inductor 30mhy	81095	EA-030
U101	Integrated circuit	01295	SN72709
S101 thru S110	Pushbutton switch 1	71590	2KBM064000

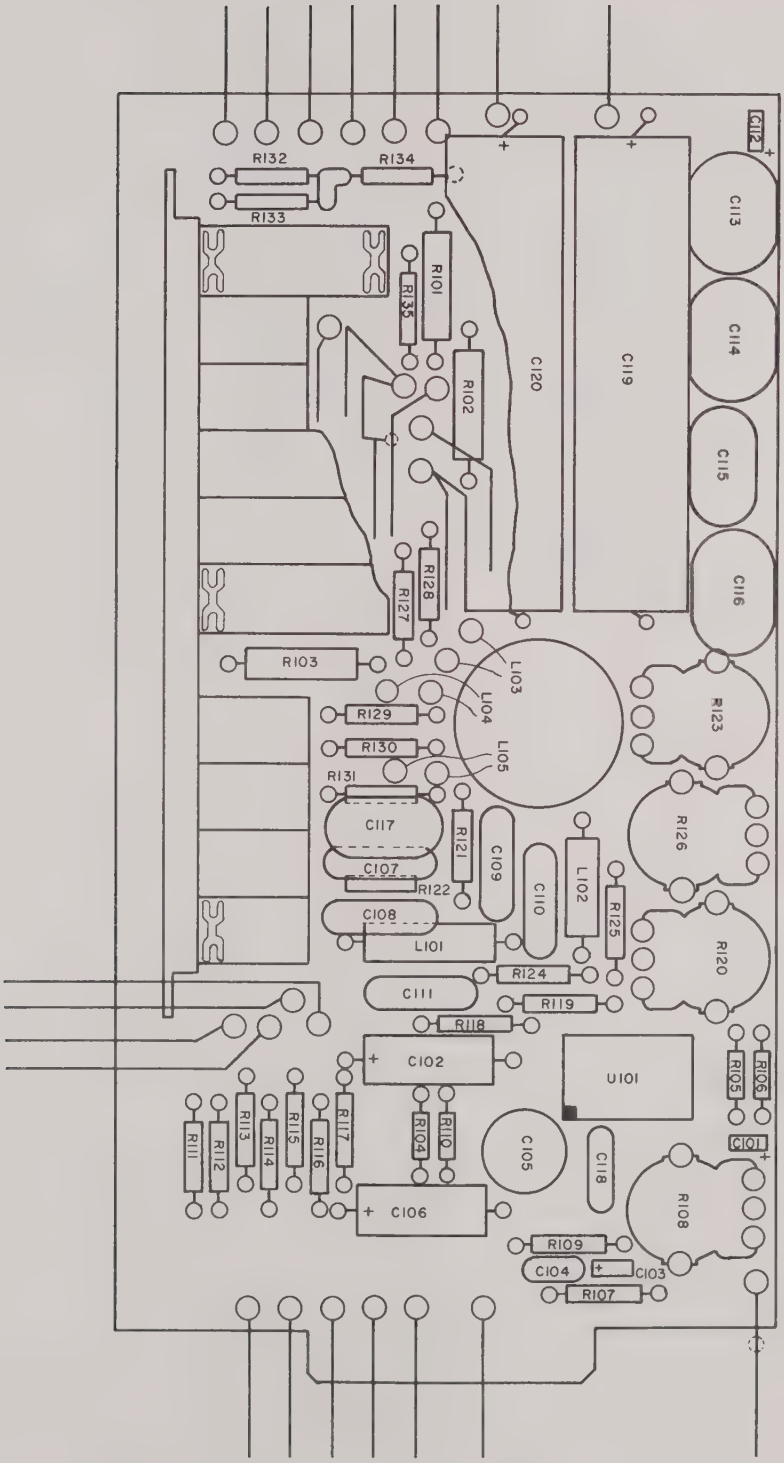


Figure 6-1. Component Location E95600

PC Board E95613

Gating and Driver Board

Ref Desig.	Description	Manufacturer (FSCM Code No.)	Part Number
R301	R: 12K, ±10%, ¼W	01121	CB
R302 and R303	Selected value		
R304	Potentiometer 1K	71450	UPE200RE1
R305	not used		
R306	Potentiometer 2K	71450	UPE200RE1
R307	not used		
R308	R: 33K, ±10%, ¼W	01121	CB
R309	R: 1K, ±10%, ¼W	01121	CB
R310	R: 100, ±10%, ¼W	01121	CB
R311	R: 1K, ±1%, 1/8W	06486	CEATO
R312	R: 10Ω, ±10%, ¼W	01121	CB
R313	R: 57Ω, ±10%, ½W	01121	CB
C301	C: 50μF, 15V	13606	TE-1160
CR301	Diode	15873	1N198
CR302	Diode	12065	1N4003
RT301	Thermistor 1K, ±10%	15801	KA31L1
Q301 and Q302	Transistor NPN,	15873	2N3903
Q303	Transistor PNP	15873	2N3905
Q304	Transistor NPN	49671	2N2102
U301	Integrated circuit	18324	SP-380A

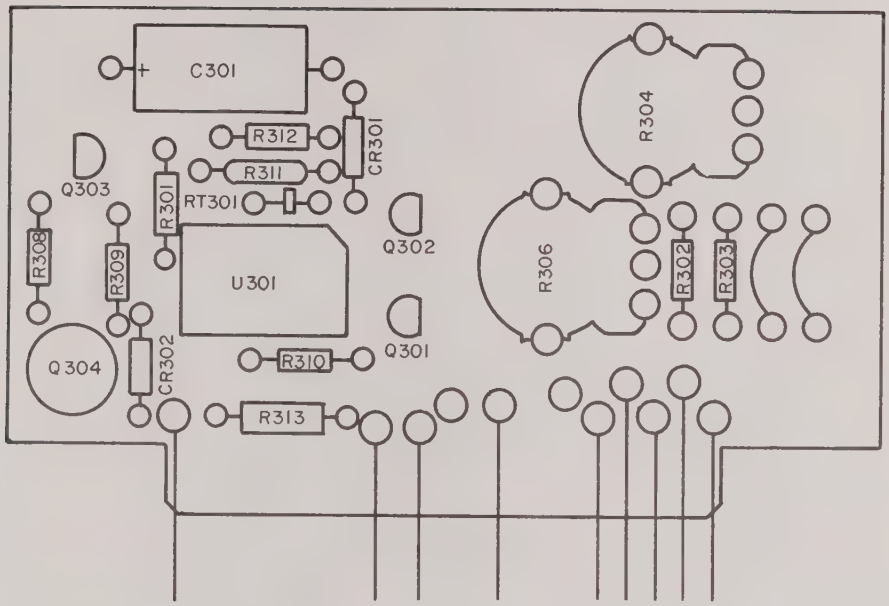


Figure 6-2. Component Location E95613

PC Board E95614

Detector and Regulator Board

Ref Desig.	Description	Manufacturer (FSCM Code No.)	Part Number
R201	R: 22K, ±10%, ¼W	01121	CB
R202	R: 100K, ±10%, ¼W	01121	CB
R203	R: 120K, ±10%, ¼W	01121	CB
R204	R: 1K, ±1%, 1/8W	06486	CEATO
R205	Potentiometer 1K	71450	UPE200RE1
R206	R: 1500Ω, ±10%, ¼W	01121	CB
R207	R: 68.1K, ±1%, 1/8W	06486	CEATO
R208	R: 8.2K, ±10%, ¼W	01121	CB
R209	not used		
R210	R: 6.8K, ±10%, ¼W	01121	CB
R211	Potentiometer 5K	71450	UPE200RE1
R212	R: 560Ω, ±10%, ¼W	01121	CB
R213 and R214	R: 1K, ±10%, ¼W	01121	CB
R215	R: 560K, ±10%, ¼W	01121	CB
R216	R: 10K, ±10%, ¼W	01121	CB
R217	R: 560K, ±10%, ½W	01121	CB
R218	R: 100K, ±10%, ¼W	01121	CB
R219	R: 1500Ω, ±10%, ¼W	01121	CB
R220 and R221	R: 10K, ±10%, ¼W	01121	CB
R222	R: 1500Ω, ±10%, ¼W	01121	CB
R223	R: 10K, ±10%, ¼W	01121	CB
R224	R: 6.04K, ±1%, 1/8W	06486	CEATO
R225	R: 665Ω, ±1%, 1/8W	06486	CEATO
R226	Potentiometer 1K	71450	UPE200RE1
R227	R: 2200Ω, ±10%, ¼W	01121	CB
C201	C: 100μF, @15V	13606	TE-1162
C202	C: 0.18μF, @75V	13606	225PZ
C203	C: 22μF, @6V	05397	K22W6K
C204	C: 100pF, @1kV	71590	DD-101
C205	C: 3.3pF, @1kV	71590	DD-3R3
C206	C: 50μF, @15V	13606	TE-1160
C207	C: 20μF, @15V	13606	TE-1157
C208	C: 1000μF, @12V	05844	9-85PSD
C209	C: 1μF, @25V	13606	5C13
C210	C: 200μF, @20V	22650	12-65PSS200-205
C211 thru C213	C: 0.47μF, @25V	13606	5C11
C214	C: 5μF, @15V	13606	TE-1152
C215	C: 0.005μF, @50V	71590	CK-502
C216	C: 200pF, @1kV	71590	DD-201
CR201 and CR202	Diodes	01295	1N4148
CR203	Diode, zener 10.0V, ±5%	15873	1N961B
Q201	Transistor, NPN	49671	2N3053
Q202	Transistor, PNP	01295	2N1375
Q203	Transistor, PNP	15873	MPS6519
Q204	Transistor, PNP	49671	2N4036
Q205	Transistor, PNP	15873	2N3905
U201 and U202	Integrated circuit	01295	SN72709
U203	Integrated circuit	49671	CA-3019
U204	Integrated circuit	01295	SN72709

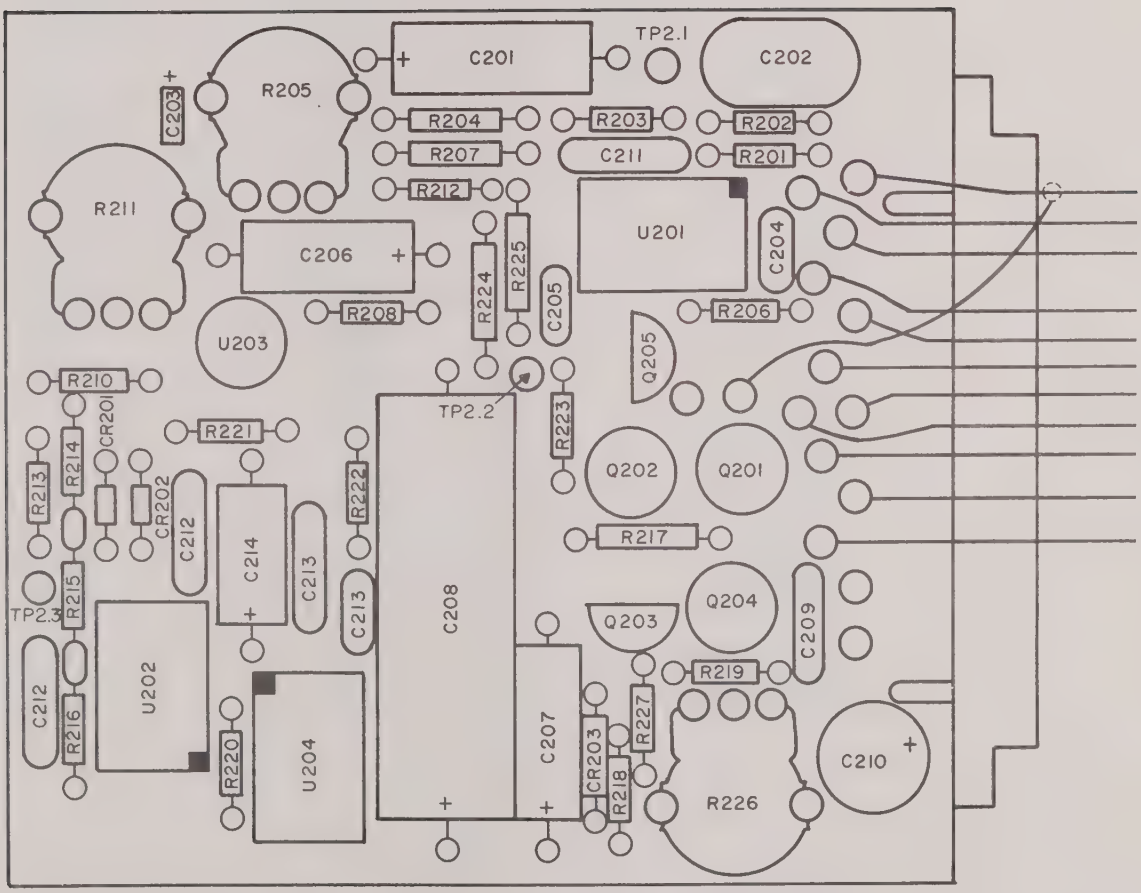


Figure 6-3. Component Location E95614

Main Assembly

Ref Desig.	Description	Manufacturer (FSCM Code No.)	Part Number
R1 and R1A	R: 400 , 10W	13606	247E4015
R2	R: 64.9Ω, ±1%, 1/8W	06486	CEATO
R3	R: 57.6Ω, ±1%, 1/8W	06486	CEATO
R4	R: 52.3Ω, ±1%, 1/8W	06486	CEATO
R5	R: 46.4Ω, ±1%, 1/8W	06486	CEATO
R6	R: 41.2Ω, ±1%, 1/8W	06486	CEATO
R7	R: 36.5Ω, ±1%, 1/8W	06486	CEATO
R8	R: 31.6Ω, ±1%, 1/8W	06486	CEATO
R9	R: 28.7Ω, ±1%, 1/8W	06486	CEATO
R10	R: 26.1Ω, ±1%, 1/8W	06486	CEATO
R11	R: 499Ω, 1%, 1/8W	06486	CEATO
R12	R: 49.9K, ±1%, 1/8W	06486	CEATO
R13	R: 215Ω, ±1%, 1/8W	06486	CEATO
CR1	Diode	12065	1N4003
CR2	Diode, zener	15873	1N1607
J1 and J2	Binding post	81073	29-1R
J3	Binding post	81073	29-1B
J4	Jack	82389	L12-B
J5	Binding post	83330	137-SP
J6	Jack	82389	L-12B
J7	Jack	82389	JJ-104
J8 and J9	Binding post	81073	29-1R
J10	Jack	82389	12-B
J11	Binding post	83330	137-SP
S1	Thumbwheel switch	08538	
S2	Timer switch	79919	71002J
S3	Slide switch	82389	46206L
S4	Pushbutton switch	82389	903
S5	Turnbutton switch	82389	9S-1175
S6	Slide switch	82389	46206L
T1	Input Xfmr	86632	NES-4640
L1	Hold coil	86632	TN-1274
M	Electrical inpulse counter	75523	TCEZ4E
DS1	Indicator light	00303	BEPH-74-G-L-L
DS2	Indicator light	00303	BEPH-74-W-L-L

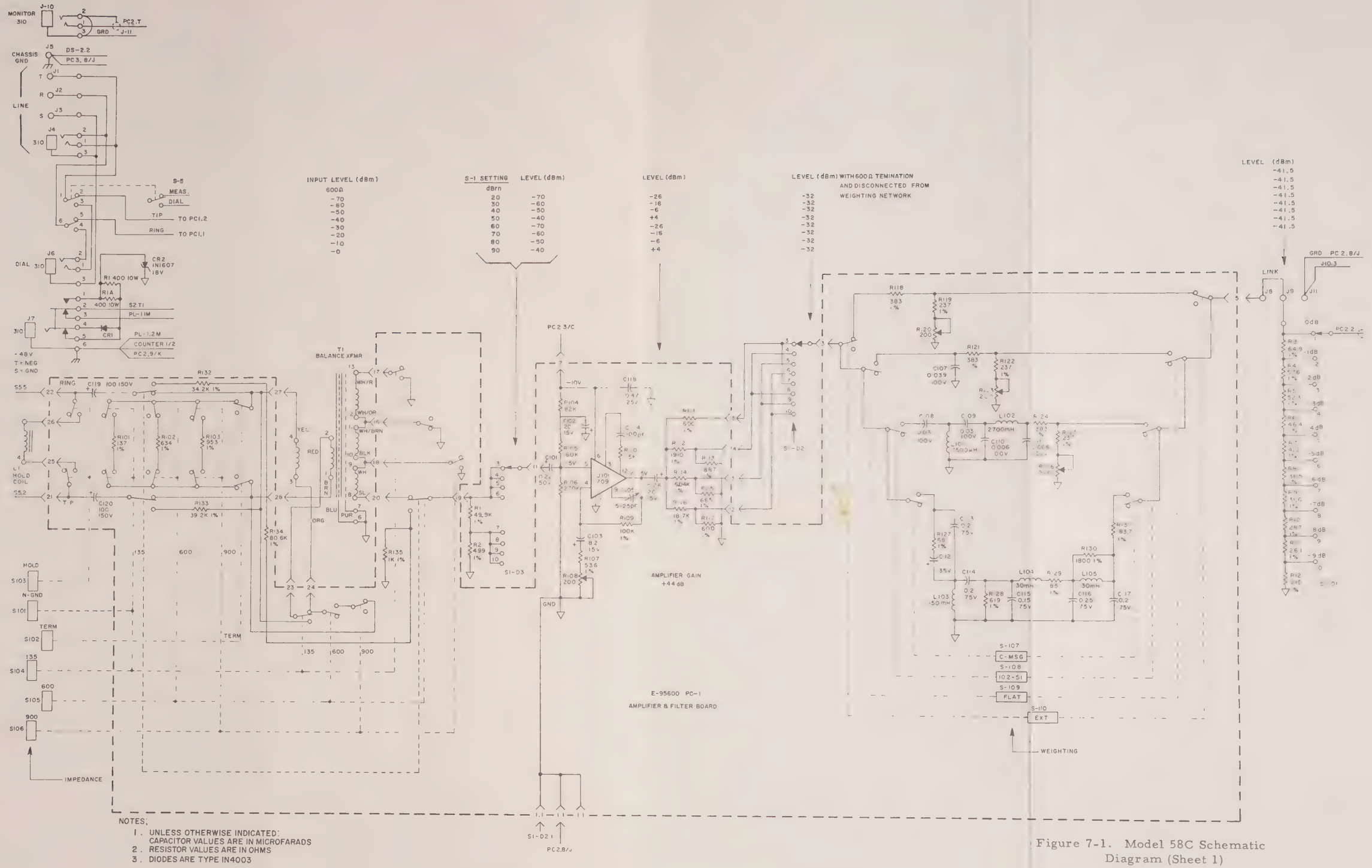
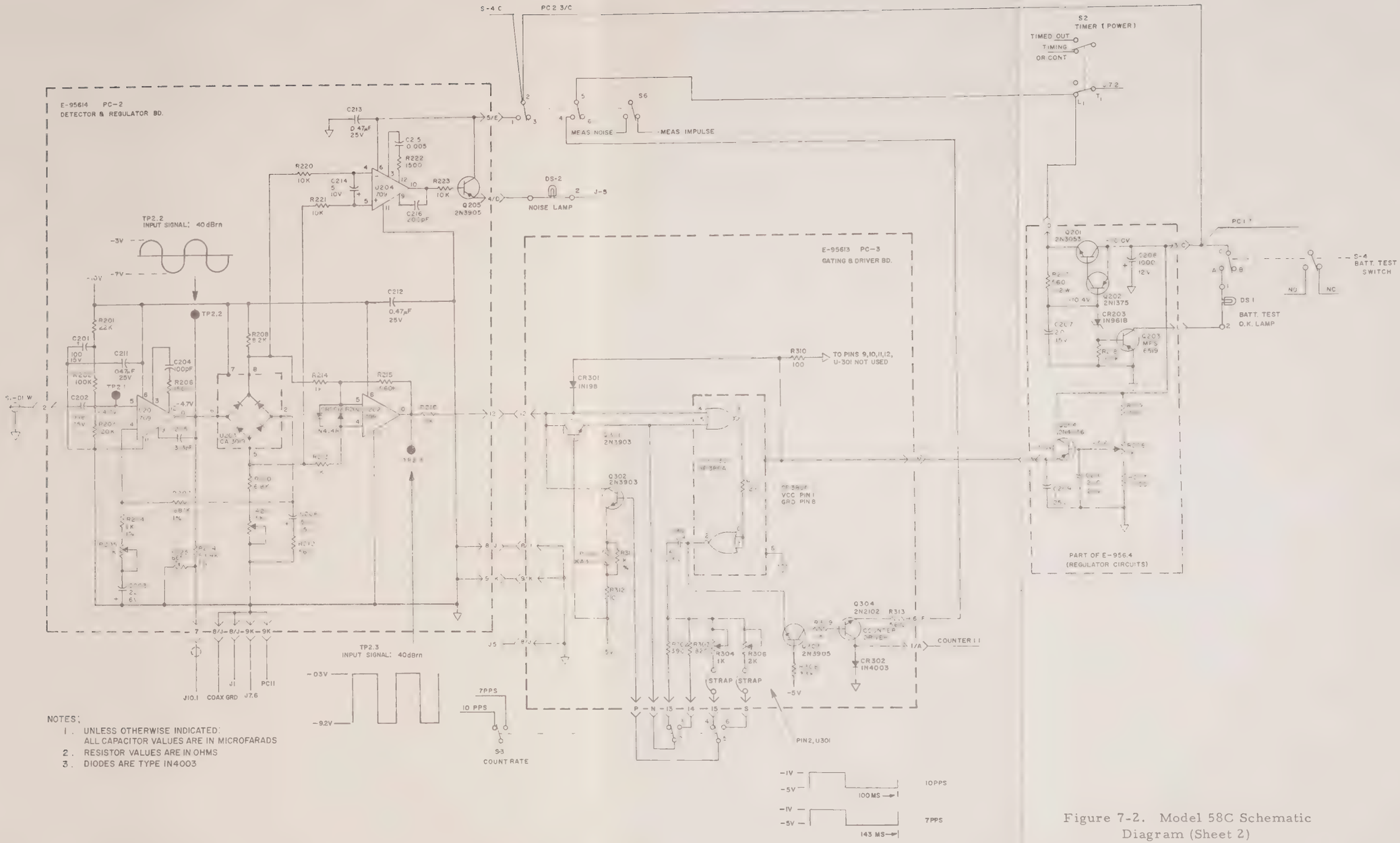


Figure 7-1. Model 58C Schematic Diagram (Sheet 1)



NOTES:

1. UNLESS OTHERWISE INDICATED: ALL CAPACITOR VALUES ARE IN MICROFARADS
2. RESISTOR VALUES ARE IN OHMS
3. DIODES ARE TYPE IN4003

Figure 7-2. Model 58C Schematic Diagram (Sheet 2)

Appendix 1

For Sets Serial No. 10-34 only

A1.1 Sets 10-34 include a cover accessory called the N-Ground Adapter. The following pages contain the technical information pertaining to this accessory.

A1.2 Paragraph 3.8 should read:

3.8 To Measure Noise To Ground: Connect line to be tested to line side of the N-GRD Adapter (optional accessory) in cover of the Model 58C. Patch output side of the adapter to 58C Line Input and place adapter by-pass switch in the N-GRD position. Set the Model 58C impedance to 600Ω Brdg.

PC Board E95676

N-Grd Adapter (Serial 10-34 only)

Ref Desig.	Description	Manufacturer (FSCM Code No.)	Number
R401	R: 1K, ±1%, 1/8W	06486	CEATO
R402	R: 80.6K, ±1%, 1/8W	06486	CEATO
R403 and R405	R: 39.2K, ±1%, 1/8W	06486	CEATO
S1	Toggle switch	09353	7401-P
J1	Jack	82389	L-12B
J2 and J3	Binding post	81073	29-1R
J4	Binding post	81073	29-1B
J5 and J6	Binding post	81073	29-1R
J7	Binding post	81073	29-1B
J8	Jack	82389	L-12B

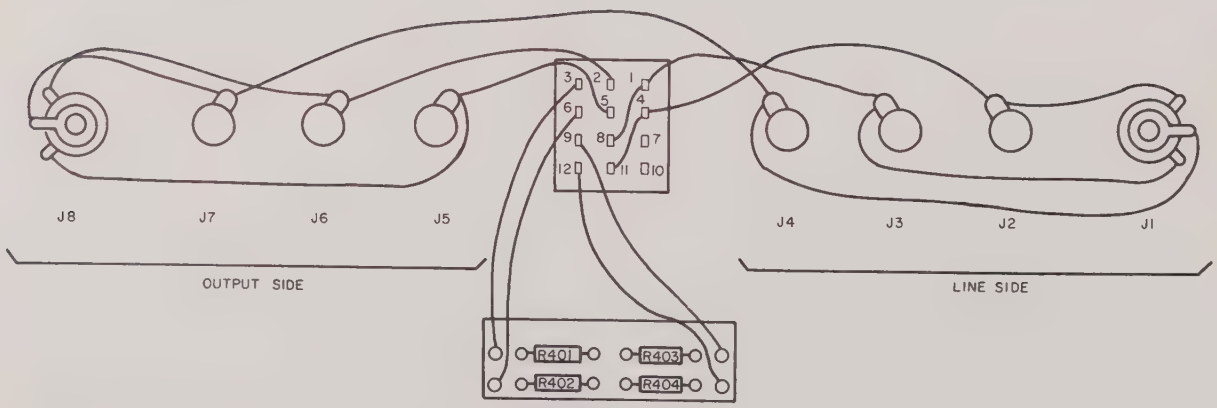


Figure A1-1. N-Grd Adapter Component Location

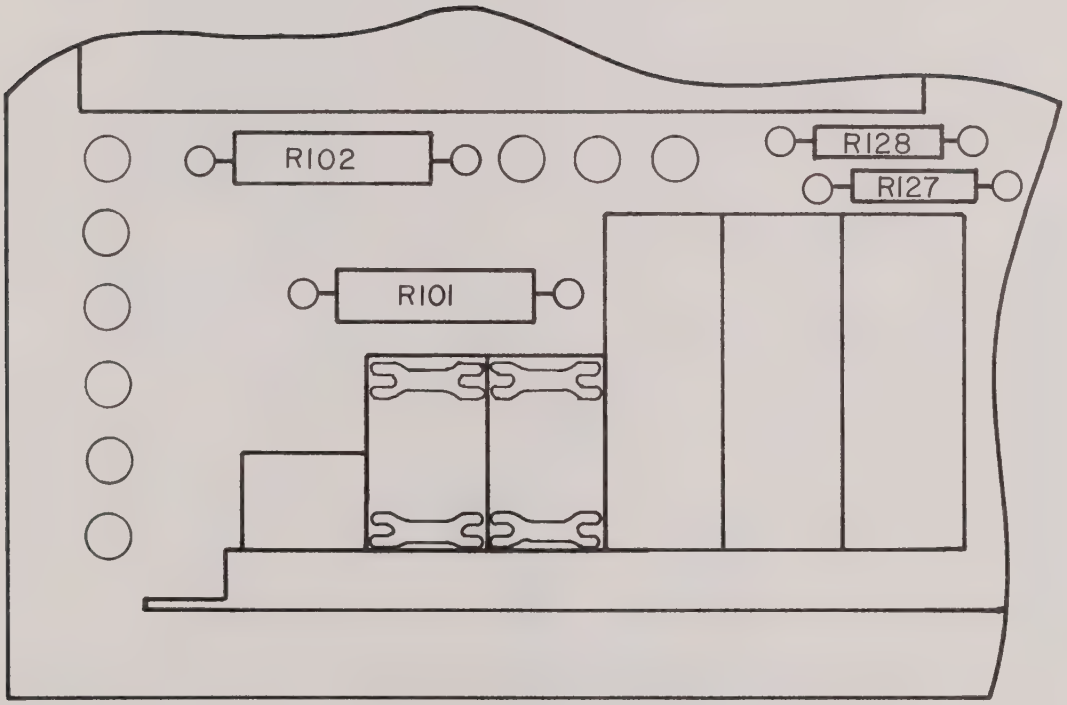
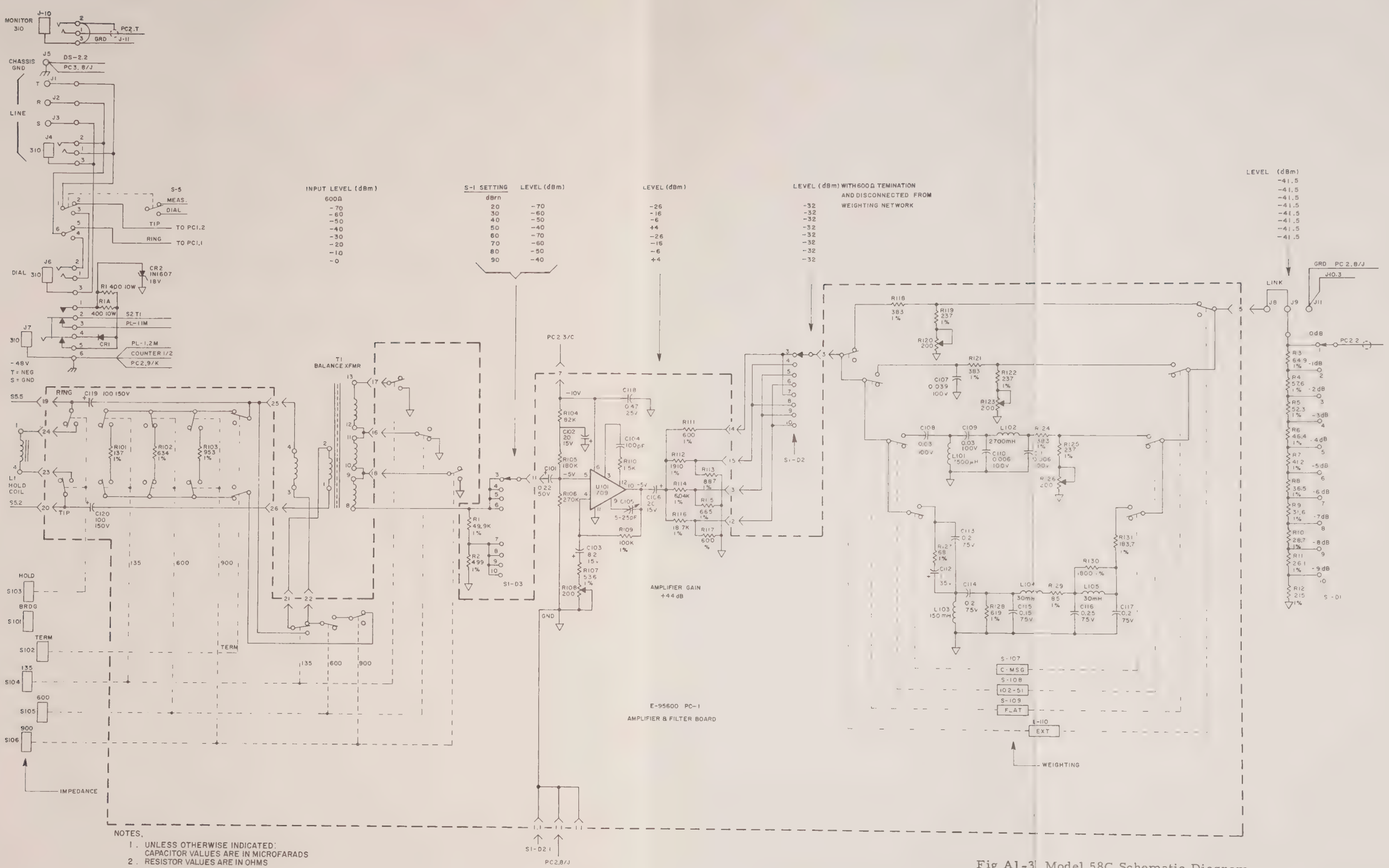


Fig A1-2 Model 58C serial 10-34, PC Board E95600, Component Location (Differences only shown , remainder of board as shown on page 6-3).



NOTES.

1. UNLESS OTHERWISE INDICATED: CAPACITOR VALUES ARE IN MICROFARADS
2. RESISTOR VALUES ARE IN OHMS
3. DIODES ARE TYPE IN4003

Fig A1-3 Model 58C Schematic Diagram
(Sheet 1, serial 10-34 only)

TTS 58C ADDENDUM 1

1. Replace figure 4-1 with the attached drawing.

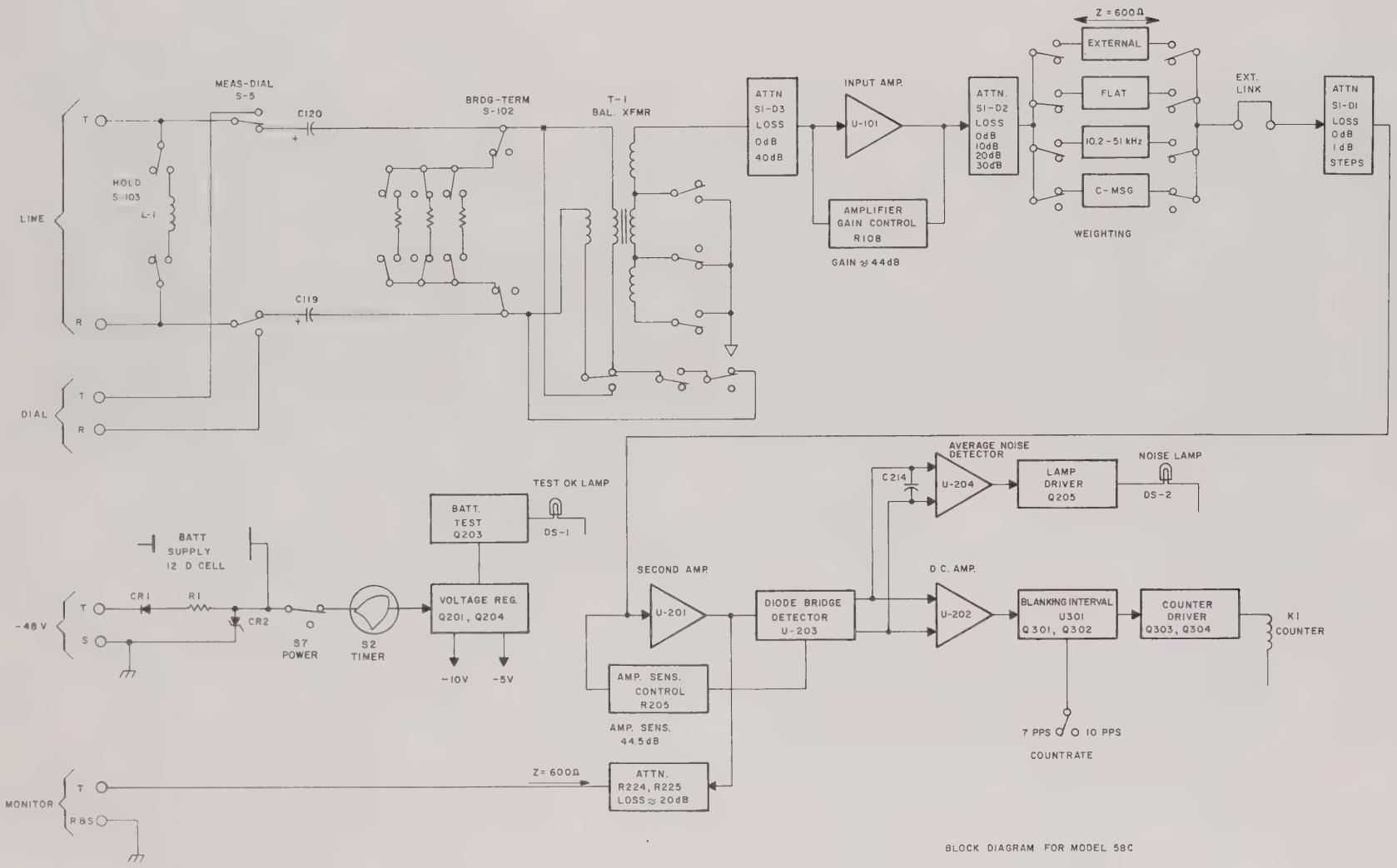
2. On the Amplifier and Filter PC Board E95600 Parts List change R109 to 49.9K

3. On the Gating and Driver PC Board E95613 Parts List change R309 to 4.7K and C301 to 56μF ±5% part number 150D566X5015R2

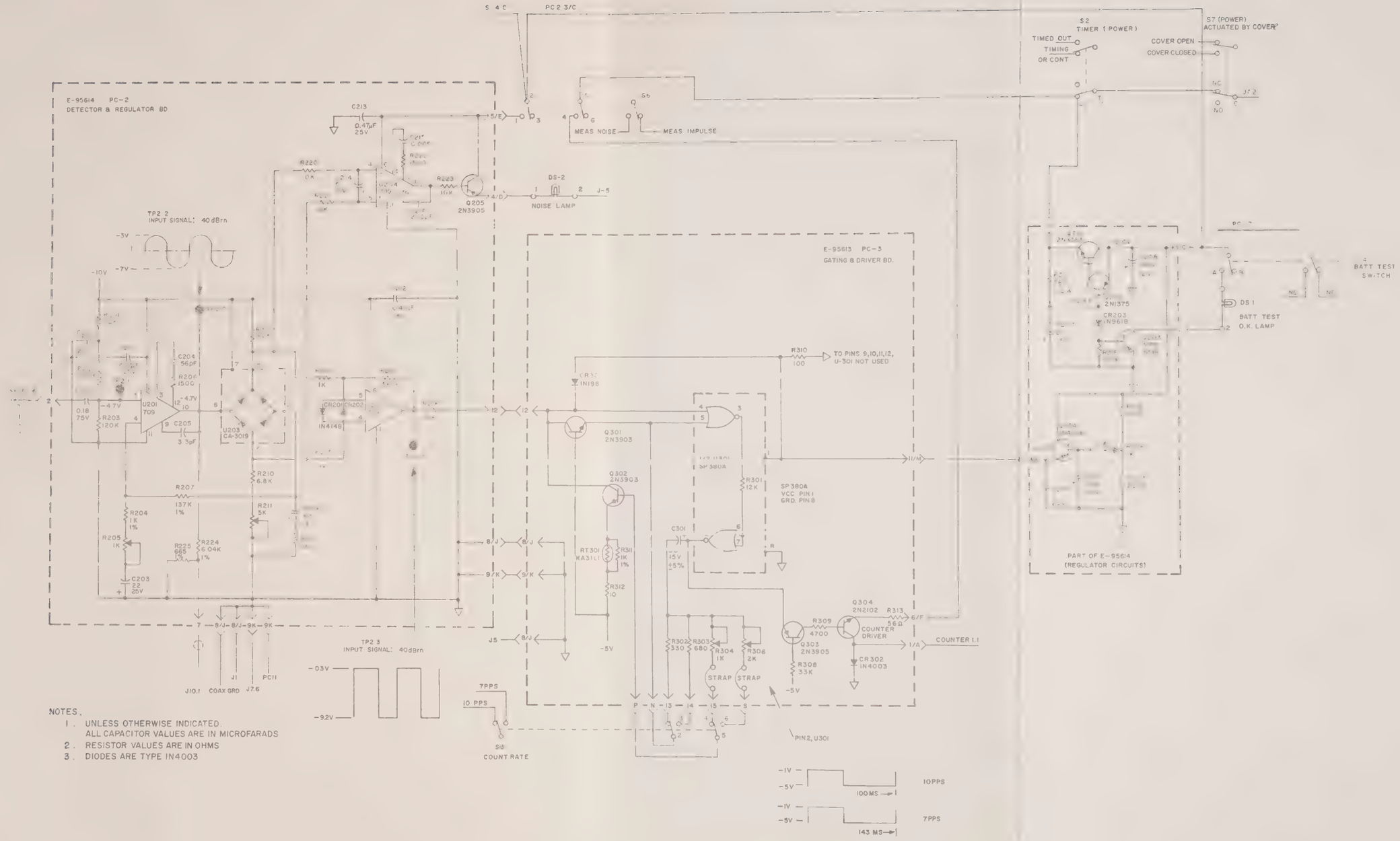
4. On the Detector and Regulator PC Board E95614 parts list; change R207 to 137K and C204 to 56pF

5. On the Main Assembly parts list; add : S7, Pushbutton Switch, 81073, 46-101B

6. Replace both sheets of figure 7-1 with the attached schematic diagram.

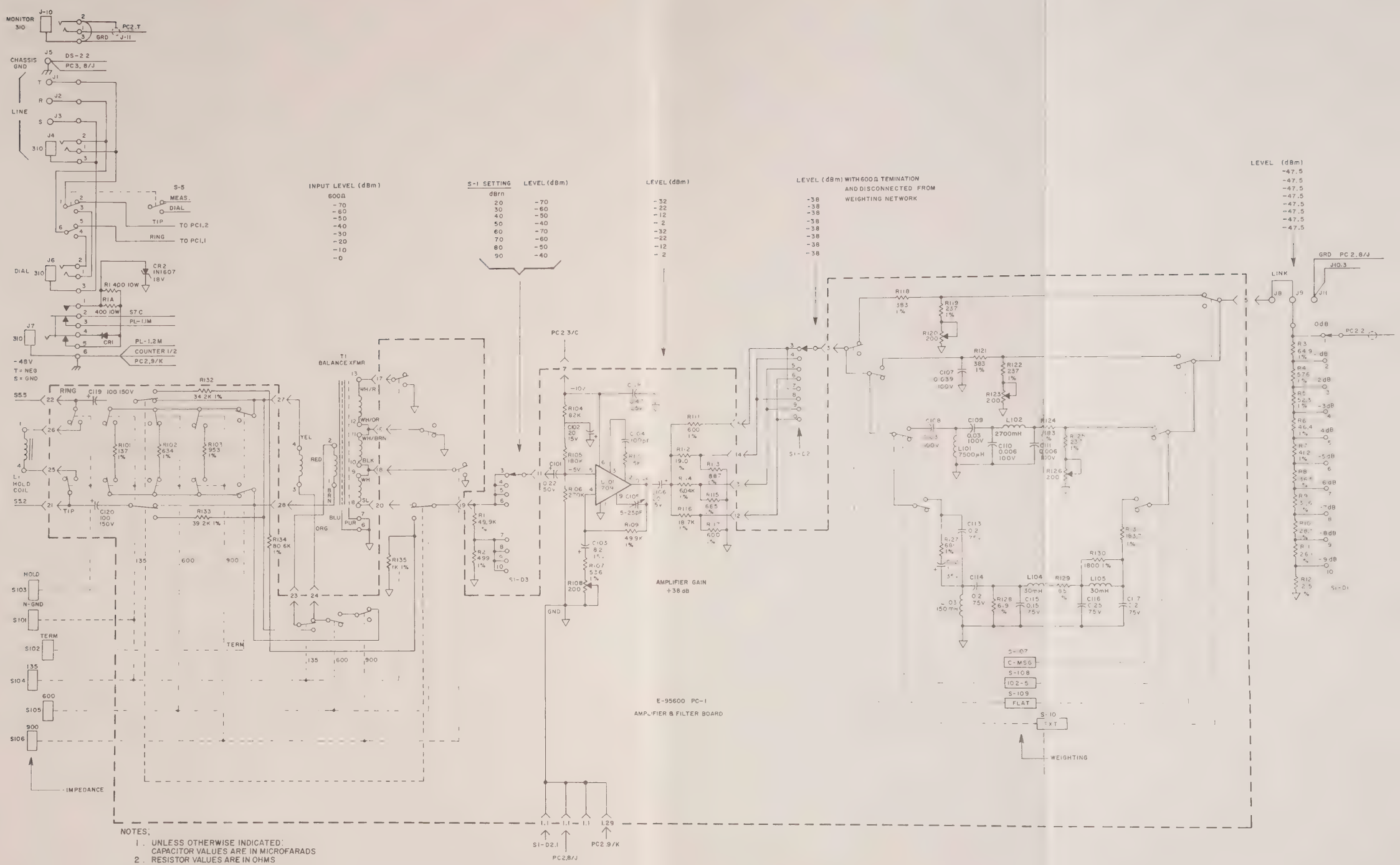


BLOCK DIAGRAM FOR MODEL 58C



NOTES.

1. UNLESS OTHERWISE INDICATED. ALL CAPACITOR VALUES ARE IN MICROFARADS
2. RESISTOR VALUES ARE IN OHMS
3. DIODES ARE TYPE IN4003



NOTES:

1. UNLESS OTHERWISE INDICATED: CAPACITOR VALUES ARE IN MICROFARADS
2. RESISTOR VALUES ARE IN OHMS
3. DIODES ARE TYPE IN4003

APPENDIX 1

OPTIONAL 1010 HZ NOTCH FILTER

A1.1 DESCRIPTION.

A1.2 The optional 1010 Hz Notch Filter is used to measure noise with a tone present. The filter provides a minimum of 50 dB rejection in series with the other three filters.

A1.3 SPECIFICATIONS.

1010 Hz Notch

± 0.5 dB from 100 Hz to 400 Hz and 1700 Hz to 10 kHz.

± 3 dB from 400 Hz to 862 Hz and 1182 Hz to 1700 Hz.

⩾50 dB from 995 Hz to 1025 Hz.

+5 dB input level.

A1.4 OPERATION.

A1.5 The 1010 Hz Notch Filter is inserted in the circuit by depressing NOTCH switch S110 in conjunction with any of the other WTG switches S107, S108 or S109. An external filter can not be used in series with the CMSG, FLAT, 10.2 –51 KHZ or NOTCH filters. The shorting link on the EXT WTG terminals must remain connected.

NOTE

The TTS 58C does not operate unless one of the three WTG switches S107, S108 or S109 is depressed and released simultaneously along with NOTCH switch S110.

A1.6 CIRCUIT DESCRIPTION.

A1.7 The 1010 Hz Notch Filter is inserted between S1 and the input of input amplifier U101. The filter provides a minimum of 50 dB rejection in series with one of the other filters to permit noise measurements in the presence of a tone.

A1.8 The 1010 Hz band-reject Notch Filter has an unbalanced input designed to work with an input impedance of 600 ohms and an output impedance of 600 ohms. The input of the Notch Filter board is a high impedance buffer amplifier comprised of U1 and associated circuitry. The output is a two-stage amplifier comprised of Q1 and Q2 and their associated circuitry. The amplifiers compensate for the insertion loss of the band reject filter into an output of 20,000 ohms.

A1.9 ELECTRONIC PARTS LIST.

A1.10 Table A1–1 lists replacement parts alpha-numerically by reference designators. Figure A1–1 shows component locations on the optional 1010 Hz Notch Filter board.

A1.11 SCHEMATIC DIAGRAMS.

A1.12 Figure A1–2 is the schematic diagram for the optional 1010 Hz Notch Filter. Figure A1–3 is sheet 1 of the overall schematic of the TTS 58C with the optional 1010 Hz Notch Filter inserted.

Table A1—1. 1010 Hz Notch Filter Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
C1	2.2UF		10%	35V	KEMET	T330A225K035AS	310002250
C2	3.3UF		10%	25V	KEMET	T33CA335K025AS	310003350
C3	2.2UF		10%	35V	KEMET	T330A225K035AS	310002250
C4	68UF		10%	15V	KEMET	T360C686K015AS	310506860
C5	2.2UF		10%	35V	KEMET	T330A225K035AS	310002250
CR1	D035	500MW		75V	TRNSTRON	1N4148	560041480
CR2	D035	500MW		75V	TRNSTRON	1N4148	560041480
CR3	D035	500MW		75V	TRNSTRON	1N4148	560041480
FL1	1010 HZ				ESC ELECT.	ESC 42F86	470100700
Q1	TO92				MOTOROLA	2N5087	552050870
Q2	TO92				MOTOROLA	2N5089	552050890
Q3	TU92AFA	310MW		25V	MOTOROLA	MPS6519	552065190
R1	590K	1/8W	1%		ELECTRA	MF5C	220259031
R2	464K	1/8W	1%		ELECTRA	MF5C	220246431
R3	604-	1/8W	1%		ELECTRA	MF5C	220260401
R4	619-	1/8W	1%		ELECTRA	MF5C	220261901
R5	14.7K	1/8W	1%		ELECTRA	MF5C	220214721
R6	46.7K	1/8W	1%		ELECTRA	MF5C	220248721
R7	3480-	1/8W	1%		ELECTRA	MF5C	220234811
R8	3740-	1/8W	1%		ELECTRA	MF5C	220237411
R9	5K	1/2W	10%	200V	HELIPOT	72PMR5K	232705023
R10	2430-	1/8W	1%		ELECTRA	MF5C	220224311
R11	4.7K	1/8W	1%		ELECTRA	MF5C	220247011
R12	1K	1/2W	10%		AB	TYPE EB	200201026
R13	56-	1/2W	5%		AB	TYPE EB	200205605
R14	1K	1/2W	10%		AB	TYPE EB	200201026
U1	8PDIL				NAT. SEMI	LM741CN	500007412

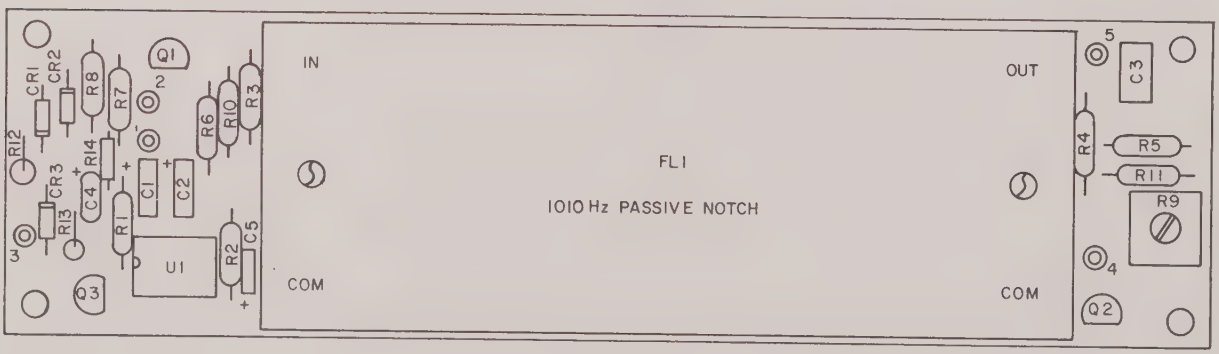
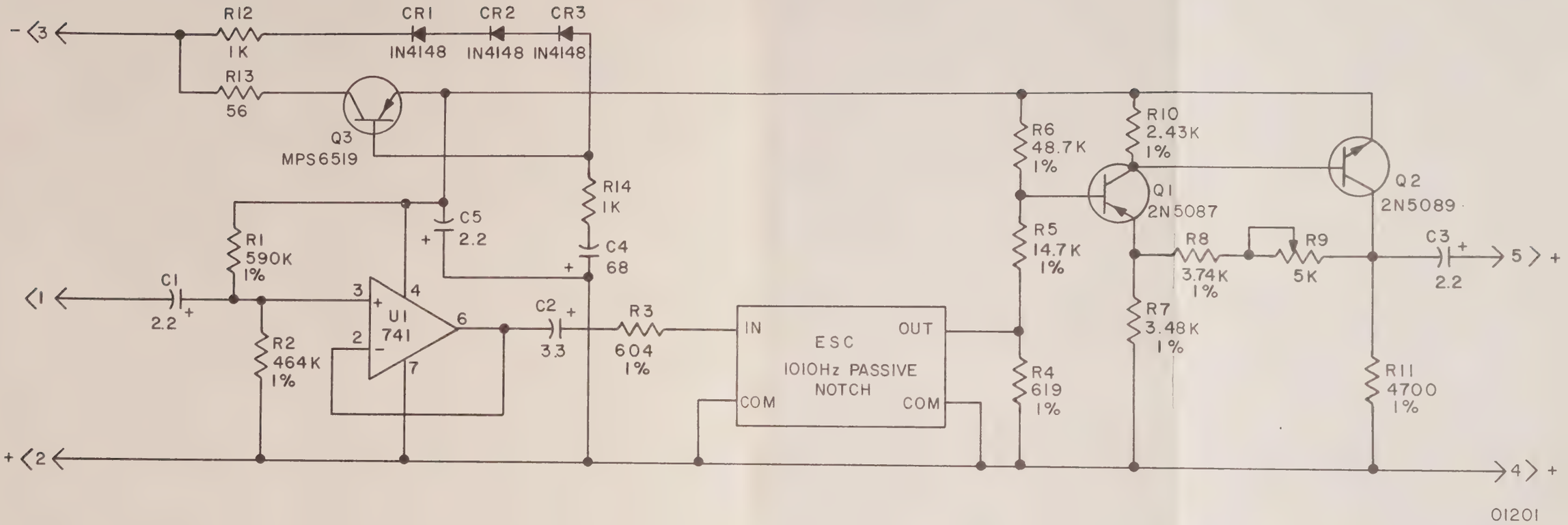


Figure A1—1. TTS 58C Optional 1010 Hz Notch Filter Component Location.



NOTES:

1. UNLESS OTHERWISE INDICATED:
   RESISTOR VALUES ARE IN OHMS.
   CAPACITOR VALUES ARE IN MICROFARADS.
   INDUCTANCE VALUES ARE IN MILLIHENRYS

Figure A1—2. TTS 58C Optional 1010 Hz Notch Filter Schematic Diagram.

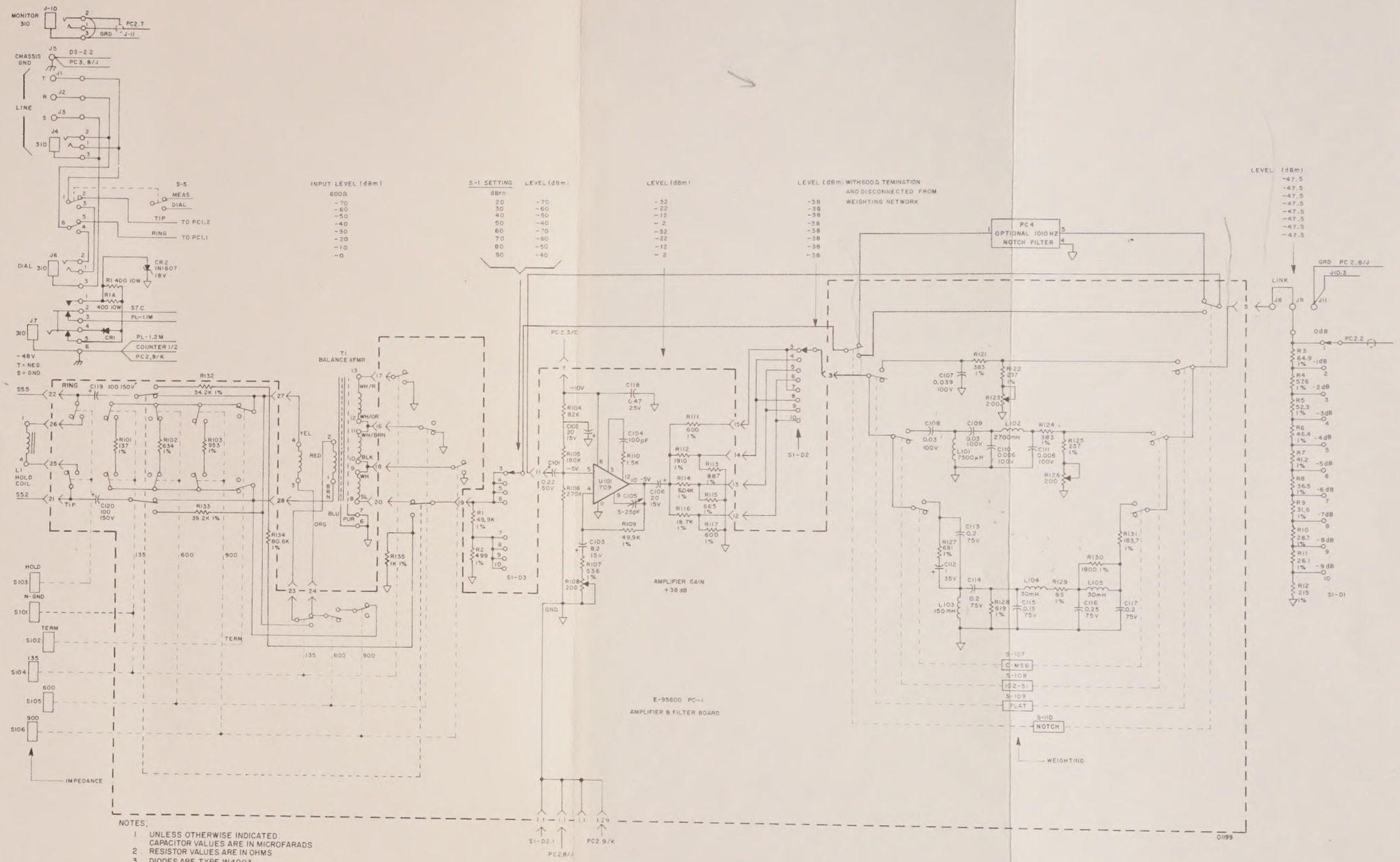
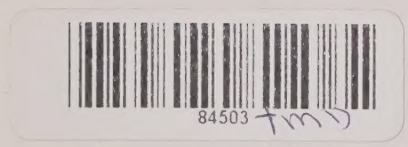


Figure A1—3. TTS 58C Overall Schematic Diagram, Sheet 1, with Optional 1010 Hz Notch Filter.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